Pokhara University

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| Level: Bachelor | Semester – Fall | Year : 2012 |
| Programme: BE | | Full Marks: 100 |
| Course: Physics (Old Course) | | Pass Marks: 45 |
| Time : 3hrs. |

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| *Candidates are required to give their answers in their own words as far as practicable.* |
| *The figures in the margin indicate full marks.* |
| Attempt all the questions. |

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|  | 1. Derive an expression for the time period and radius of gyration of a compound pendulum and show that centre of oscillation and center of suspension are interchangeable. 2. The equation of a transverse wave traveling along a string is given by, y =10 sin∏ (0.01x-2t), where y is in mm and t is in second. Find 3. Velocity and wavelength of the wave. 4. Equation of the wave travelling in opposite direction with double amplitude. | 9  6 |
|  | 1. Derive an expression for the velocity of a longitudinal wave in fluid medium in terms of its bulk modulus and density. 2. The dispersive power of crown and flint glasses are 0.016 and 0.032 respectively. Calculate the focal lengths of the lenses made of crown and flint glasses which forms an achromatic doublet of equivalent focal length 20 cm when placed in contact. | 8  7 |
|  | 1. What is meant by polarization of light? Describe how you will produce linearly, circularly and elliptically polarized light. Explain with mathematical calculation. 2. In Newton’s ring experiment, the diameter of the 16th ring was found to be 0.590 cm and that of the 6th ring was 0.336 cm. If the radius of the plano convex lens is 100 cm, calculate the wavelength of light used. | 9  6 |
|  | 1. What is capacitance? Write down the expression of capacitance of cylindrical capacitor which has a inner and outer radius a and b respectively. Explain why induced charge is always less in magnitude then free charge. 2. A 100μF capacitor is charged to a potential difference of 50 volts, the charging battery then being disconnected, the capacitor is then connected to second capacitor in parallel. If the measured potential drop to 35volts, what is the capacitance of the second capacitor? | 9  6 |
|  | 1. State Biot-Savart's law and apply to calculate the flux density of magnetic field due to an infinite long straight conductor. Can the result for the infinite long straight conductor be used for a conductor of finite length?   **OR**  Derive the expression for force per unit length between two infinite current carrying conductors. Define one ampere current.   1. What is the initial rate of increase of current and final saturation current in an RL circuit with L = 15 mH, R = 24 Ω and emf = 10 V? | 9  6 |
|  | 1. Obtain all four Maxwell’s wave equation in free space in terms of and . 2. A long solenoid is formed by winding 20 turns per cm. What current is necessary to produce a magnetic field of 20 mT inside the solenoid? | 9  6 |
|  | Write short notes on **any two:**   1. Production and uses of ultrasound 2. What is Brewster's law 3. Displacement current | 2×5 |